

Final Technical Report

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PI: Dr. David Soderblom, Space Science Telescope Institute
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Title: *The Age Related Properties of Solar Type Stars*
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A number of investigations, projects, and results were supported by this grant. They included important observational studies of solar-type stars in clusters, and applied the reach of Keck+HiRes to this problem. The following papers resulted from work undertaken as part of this grant:

Soderblom, D. R., Jones, B. F., and Stauffer, J. R. "The Evolution of the Lithium Abundances of Solar-Type Stars. V. K Dwarfs in the Hyades." 1995, *Astron. J.*, 110, 729-732.

Soderblom, D. R., Henry, T. J., Shetrone, M. D., Jones, B. F., and Saar, S. H. "The Age-Related Properties of the HD 98800 System." 1996, *Astrophys. J.*, 460, 984-982.

Henry, T.J., Soderblom, D. R., Donahue, R., and Baliunas, S. L. "A Survey of Ca II Chromospheric Emission in Southern Solar-Type Stars." 1996, *Astron. J.*, 111, 439-465.

Jones, B. F., Shetrone, M. D., and Soderblom, D. R. "The Evolution of the Lithium Abundances of Solar-Type Stars. VI. The End of Lithium in the Pleiades." 1996, *Astron. J.*, 112, 186-191.

Jones, B. F., Fischer, D., Shetrone, M. D., and Soderblom, D. R. "The Evolution of the Lithium Abundances of Solar-Type Stars. VII. M34 (NGC 1039) and the Role of Rotation in Lithium Depletion." 1997, *Astron. J.*, 114, 352-362.

Mason, B. D., Henry, T. J., Hartkopf, W. I., Brummelaar, T., and Soderblom, D. R. "A Multiplicity Survey of Chromospherically Active and Inactive Stars," 1998, *Astron. J.*, 116, 2975-2983.

Jones, B. F., Fischer, D., and Soderblom, D. R. "The Evolution of the Lithium Abundances of Solar-Type Stars. VIII. M67 (NGC 2682)" 1999, *Astron. J.*, 117, 330-338.

The studies of lithium in solar-type stars in clusters of a wide range of ages has provided critical information on a tracer of convective processes, especially among very young stars. Our most recent work has been on a pre-main sequence cluster (NGC 2264) that took place after this grant expired, but was founded on it. The spread seen in Li in Zero-Age Main Sequence clusters like the Pleiades is huge and possibly related to rotation. No clear spread is seen in NGC 2264, so it does not have its origins in the conditions of formation but is instead a result of processes occurring during PMS evolution.

Our observations of M67 were particularly interesting because this cluster is the same age as the Sun; i.e., very old. Clear evidence was seen for a spread in Li there too, indicating that the spread seen in very young stars perpetuates itself into old age.

Final Patent/Invention Report

Grant #: NAGW-3695

Title: *The Age Related Properties of Solar Type Stars*

Principal Investigator: Dr. David Soderblom

No patents or inventions resulted from this grant.